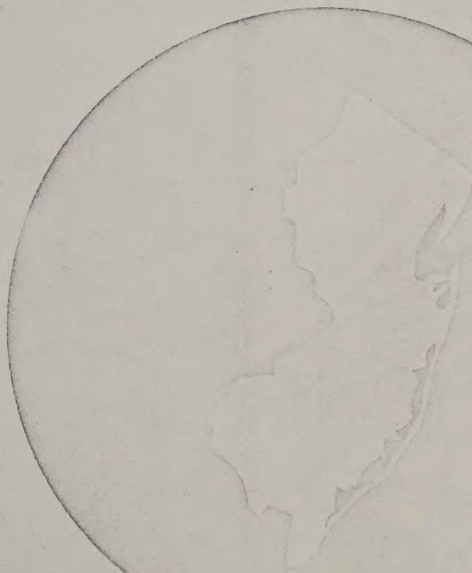
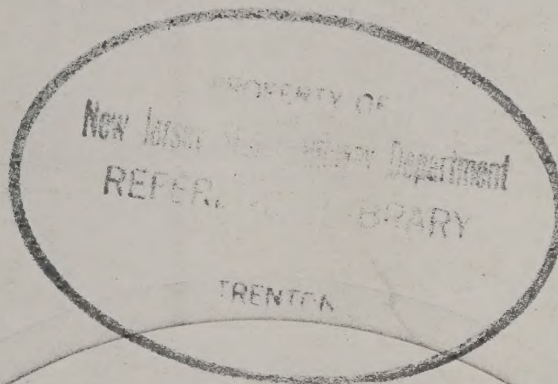


Basic highway problems in NEW JERSEY



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The new Walt Whitman Bridge over the Delaware is symbolic of recent progress in meeting highway needs and it is symbolic of the challenge ahead—traffic is expected to double over that of today in all too short a time, 20 years, perhaps less.

basic highway problems in NEW JERSEY

a report to Commissioner Dwight R. G. Palmer
New Jersey State Highway Department, Trenton, N. J.

prepared by the Automotive Safety Foundation, Washington, D. C.
April 15, 1960

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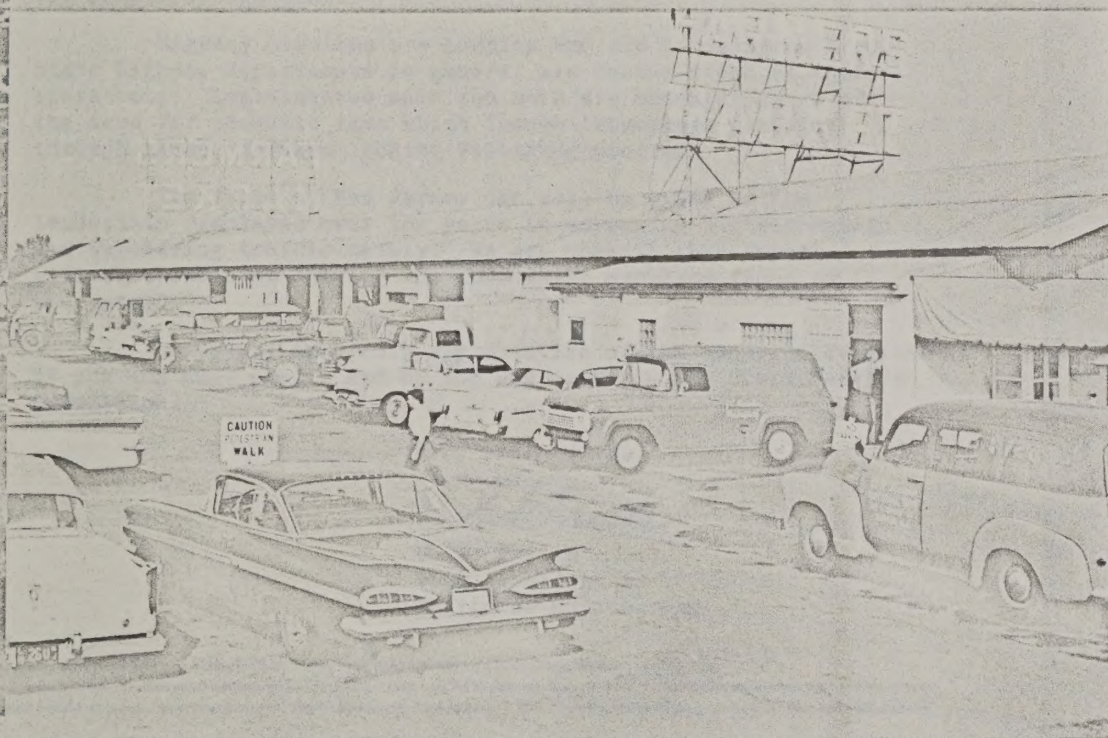
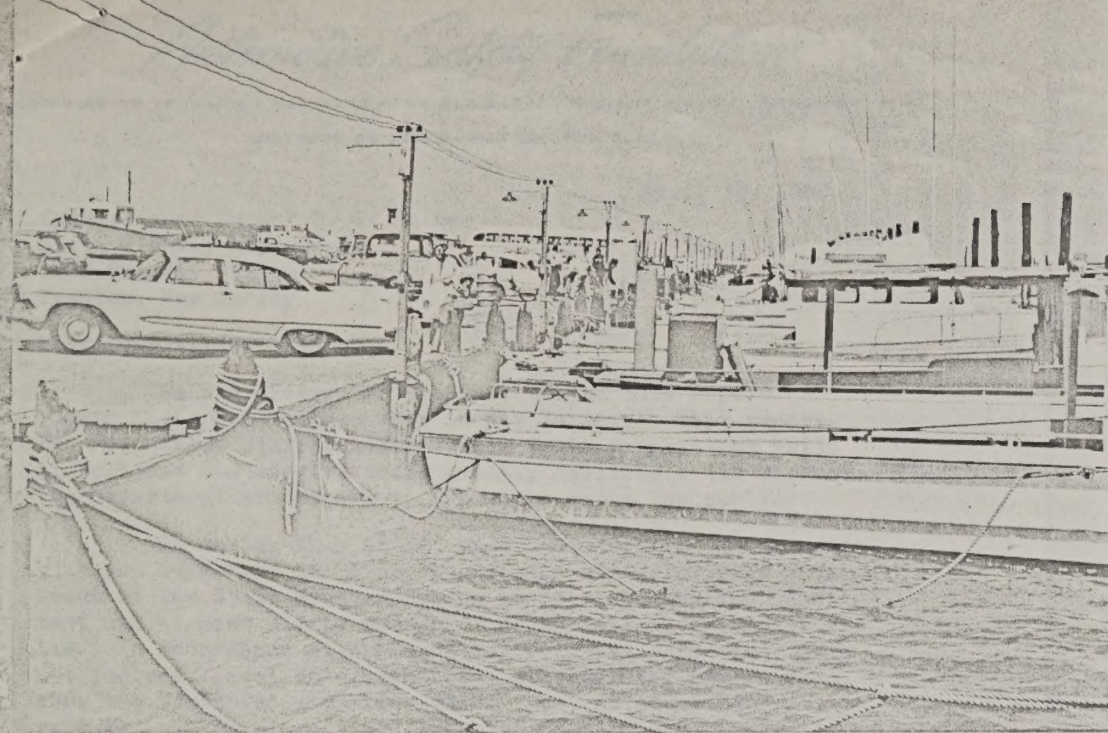
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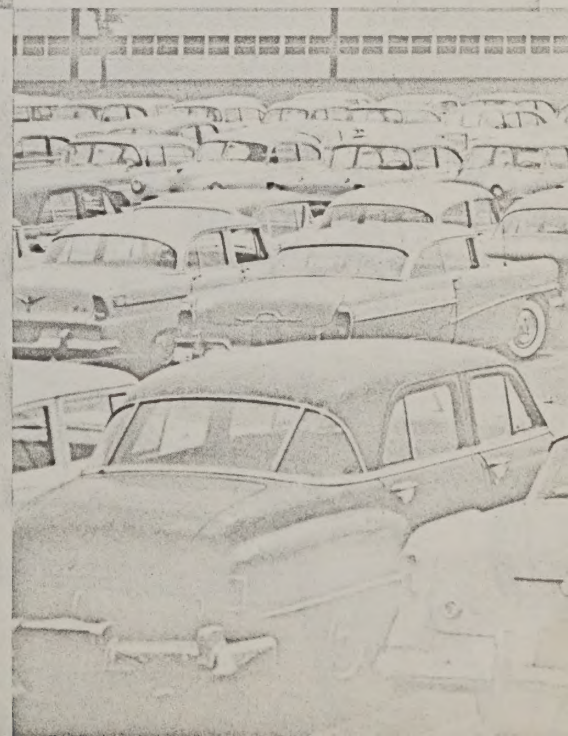
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The recreational center, farmer's market, and parking at a new industrial plant—these are but three of countless traffic destinations which must be served well, directly by New Jersey State Highways. Delay in providing needed highway improvement will handicap New Jersey's economy.



Automotive Safety Foundation

DEDICATED TO EDUCATION AND RESEARCH FOR SAFE, EFFICIENT HIGHWAY TRANSPORTATION

200 RING BUILDING • WASHINGTON 6, D. C.

April 15, 1960

Commissioner Dwight R. G. Palmer
State Highway Department
1035 Parkway Avenue
Trenton, New Jersey

Dear Commissioner Palmer:

We are pleased to transmit to you this report, "Basic State Highway Problems in New Jersey." This report, the Foundation staff believes, sets forth suggestions which if followed and adopted would greatly facilitate the work of the Department and enable it to better serve the public.

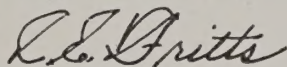
In making this study, under the terms of an agreement with you September 15, 1958, Foundation staff reviewed physical needs of the State Highway System as developed by the Department and studied allied phases of organization, personnel and law. In accordance with Foundation policies this study does not include fiscal determinations, although the report does show the financial situation which the Department faces. The rate and method of meeting financial requirements are matters for serious consideration by the Governor, the legislature and the people of the state.

Highway problems are complex and are becoming more so. State highway departments in general are taking stock of their operations. Legislatures more and more are becoming aware of the need for adequate laws which insure long-range planning through sound, forward-looking financing programs.

The State of New Jersey can well be proud of the leadership displayed over the years in advancing highway design and furthering traffic safety. We are hopeful this report will contribute to solving the increasing problems faced in your state.

Our staff is highly appreciative of the cooperation given by you and your staff, and by the New Jersey State Civil Service Commission.

Very truly yours,



C. E. Fritts
Vice President in
Charge of Engineering

A non-profit organization supported by more than 600 companies and associations representing . . .
Automobile Manufacturers, Petroleum and Asphalt, Parts and Accessories, Rubber Tire, Advertising Agencies and Media, Steel,
Automobile Finance, Portland Cement, Major Banks, Automobile and Tire Dealers, Insurance, and School Bus Manufacturers



Adjacent land developments frequently call for the use of imagination and ingenuity. The problem posed on this section of Route 21 by the Passaic River, railroad and cemetery was solved by placing one roadway on top and the other as may be observed at the top of the photograph.

AUTOMOTIVE SAFETY FOUNDATION

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Summary

The next 15 years will be crucial ones in New Jersey's highway transportation development. Between now and 1975 the volume of traffic moving over the state's roads and streets will nearly double. It is estimated that, in 1975, highway travel in New Jersey will total 47 billion vehicle miles, compared to a present-day level of 24 billion miles a year.

Unless steps are taken at once to provide for the safe and efficient movement of this increased traffic load, New Jersey faces a highway transportation problem of critical dimensions.

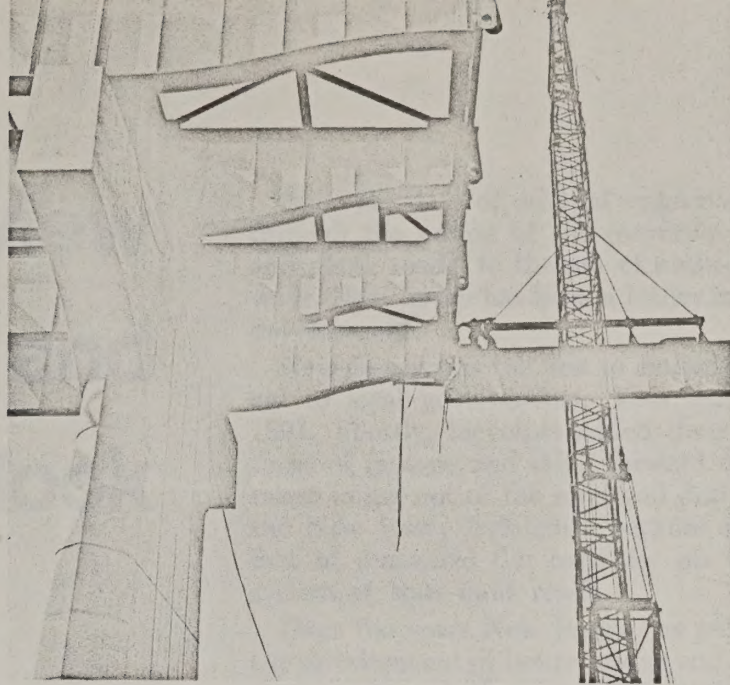
One high priority need is for the improvement of highway facilities.

The National System of Interstate and Defense Highways, of which the Federal government is financing 90 percent of the cost, includes 368 miles in New Jersey. Appropriations by the Congress will determine the rate of progress on this mileage. Completion is expected during the early 1970's.

Apart from Interstate mileage, the 20-year program requires improvement of 2,392 miles of highway at a total cost of \$1,637 million, of which \$1,540 million will be needed during the first 15 years — an average expenditure for construction of more than \$100 million per year. New Jersey must spend at least \$282 million during the next five years to overcome existing critical conditions on the State Highway System; \$514 million during the following five-year period; \$744 million in a third five-year period; and some \$97 million during the final five of the 20 years.

Methods of highway finance are outside the scope of this study and report. However, it is apparent that the needs of the state only can be met if the legislature develops an equitable fiscal plan to assure revenues on a basis which will permit orderly long range programming of highway improvements. Importance of a sound fiscal plan is highlighted by two facts:

1. Under present financing procedures, the Highway Department does not know from one year to the next how much money will be available for its operations and consequently cannot plan ahead on any sound and orderly basis.



2. Under present procedures, during the period 1954-1958, from 17 to 39 percent of revenue collected through New Jersey taxes on highway users has been diverted to non-highway purposes, according to statistics compiled by the Federal government.

A second need is for an efficiently organized traffic engineering program which will insure the optimum operating conditions on existing as well as on newly-constructed roads and streets. The growing importance of highway operations dictates that major responsibilities for this function of state government should be centered within the Highway Department.

A third need is a review and modernization of New Jersey's highway and traffic laws in light of present day and future needs. Such action is essential to eliminate conflicts, duplications, overlappings and ambiguities which now exist in the state's statutes and which hamper efficient management of highway affairs.

A fourth need is for a review of highway system classification. Such a study should concern itself with the character and volume of traffic carried by the various routes in New Jersey in order that roads which are of statewide importance can be included in the State Highway System and those that are of only local importance can be assigned to local control. Facts developed through such a study would permit appropriate action by the legislature to create an integrated highway transportation plan.

A final need is for the development of a plan for the reorganization of the Highway Department in the interest of more efficient management. Action already has been initiated by the Department on the studies necessary for such a reorganization. Civil Service Commission officials have expressed willingness to cooperate in solving any attendant personnel problems. Appropriate legislative action also will be needed.

The findings on which the above conclusions are based are set forth in this report.

Review and outlook

From the days of colonial stagecoach routes, through the period of the primitive turnpikes and plank roads, to the era of multi-lane freeways, New Jersey has been a leader in highway development.

New Jersey was the first to extend state road aid to local governments. That was done in 1891. Shortly, bicyclists added their voices to those of farmers and other forward steps were taken to get out of the mud and dust. In 1912 the New Jersey legislature became one of the first to recognize the need for an integrated system of state-built roads.

Over the years New Jersey has pioneered in the development of better bridge and pavement designs, clover-leaves, overpasses, rotary intersections, divided highways and controlled access highways, double dual highways, traffic barriers to prevent head-on and side swipe accidents, and just recently low-level bridge lighting.



This is one of many of New Jersey's heavily traveled arteries, Route 21 in the vicinity of Newark. Costly congestion can be eliminated only by providing additional traffic lanes.

Much of this pioneering has been necessitated by New Jersey's unparalleled statewide traffic volumes which result from several factors. Among these are the second highest density of population in the nation; vast industrial activity, widespread agricultural production, 127 miles of seashore resort areas, and one of America's highest ratios of automobile ownership to population.

Despite the State's historic location as a corridor through which tremendous volumes of interstate traffic must flow (more than 200 million interstate crossings a year) 80 per cent of all travel is by New Jersey registered vehicles. Currently the State Highway System averages some 12,000 vehicles per mile daily (about five times the national average) with peak loads of more than 100,000 vehicles a day at several locations.

In short, New Jersey has become a vortex of

traffic, demanding not only the best engineering and management talent, but complete legislative and public understanding of the problem if the challenge of the future is to be met successfully.

Growth of the System

A big forward step was taken by the legislature in 1917 when it created a State Highway Department and designated 15 routes, totalling 679 miles, as the State Highway System. A decade later this system was expanded to 1,842 miles and \$305 million was provided for its improvement.

Efforts of the past, creditable as they were, have not been sufficient to keep pace with growing traffic needs. Tremendous increases since the last war have magnified the problems of earlier years. Pressures of the heavy volumes



Construction Expenditures — State Highways and Toll Roads



between the New York, Camden-Philadelphia and seashore areas resulted in construction of the New Jersey Turnpike and the Garden State Parkway and older roads in other parts of the state have been widened to give added capacity.

Today's operating State Highway System totals 1,833 miles, and is supplemented by 304 miles of toll roads which, while not part of the State Highway System, are certainly part of the State's total highway transport system. Miles of highway do not tell the traffic-carrying story as well as the miles of traffic lanes. The table below shows the total mileage by number of lanes and by lane miles. Lane miles have been increased by nearly 40 percent since 1945.

The State Highway System and the two toll facilities together carry 43 percent of the state's total highway travel.

In the effort to meet the challenge, the state has spent \$877 million of state funds, Federal funds, and toll road bond funds for construction and reconstruction of major highways and streets since 1945. And still this has not been

enough to get ahead and keep ahead of congestion and accidents on major thoroughfares.

Miles, State Highways and Toll Roads
(1958)

No. of Lanes	Rural Miles	Urban Miles	Total Miles	Total Lane Miles
2	938	252	1,190	2,380
3	8	34	42	126
4	354	329	683	2,732
5		3	3	15
6	133	77	210	1,260
Over 6		9	9	78
Total	1,433	704	2,137	6,591

A Look at the Future

From 1940 to 1950, population in New Jersey grew from 4,160,000 to 4,835,000 people. Current estimates place the population of the state at about 5,500,000 people. Median esti-

mate of the U. S. Bureau of the Census anticipates that the population of the state by 1975 will approximate 7,300,000 people, an increase of 33 percent.

More Vehicles to Come

In 1958 there were 2.3 persons per vehicle registered in the state. The trend in ownership—more vehicles per family and more families with vehicles—points to a ratio of 2.0 persons per vehicle by 1975. This ratio of ownership, together with anticipated growth in population, would mean 3,700,000 vehicles registered in New Jersey by 1975, an increase of 54 percent over today's 2,400,000 vehicles.

Travel Will Increase, Too

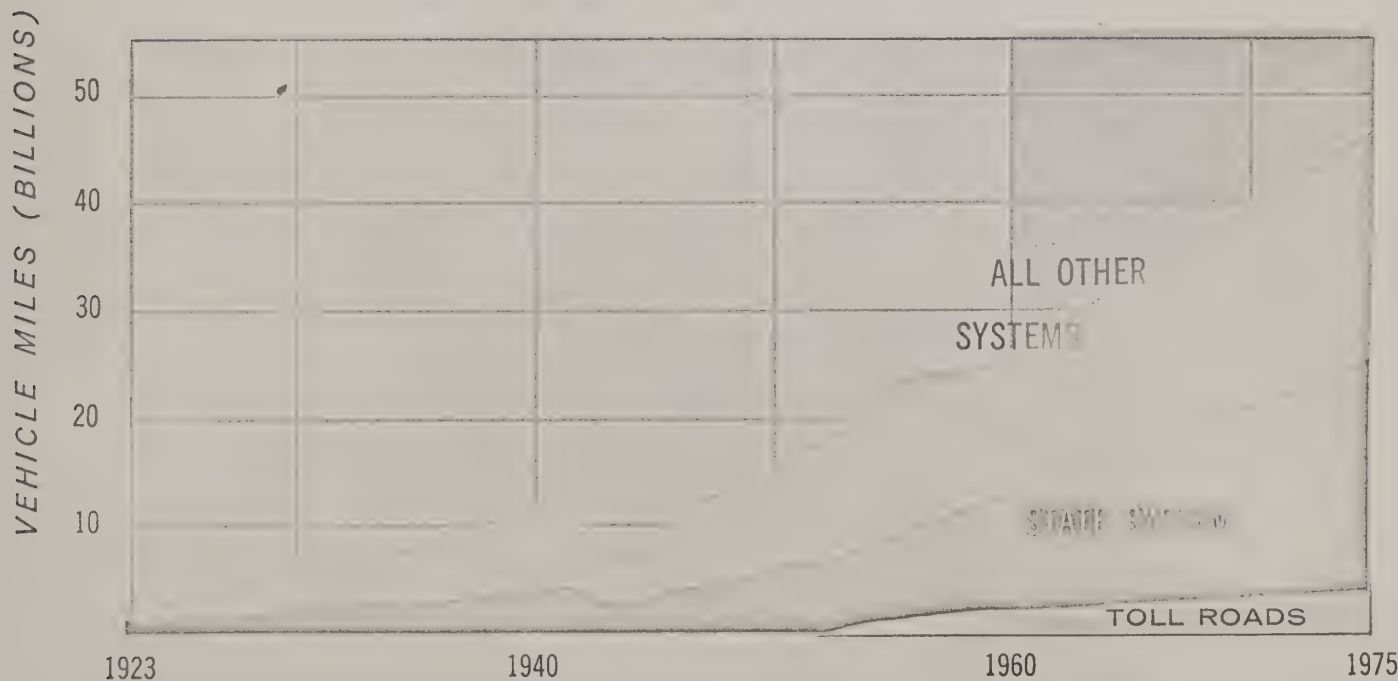
Vehicles traveling in New Jersey in 1958 rolled up 24 billion vehicle miles; an average of 10,000 miles for each vehicle registered in the state. The lakes and mountains in the northwest part of the state and the sandy beaches of the Atlantic coastline furnish convenient vacation-lands for two of the nation's largest metropolitan areas—New York and Camden-

Philadelphia. As populations in those areas increase and as highway facilities are improved, it is expected that in 1975 the mileage traveled in New Jersey, averaged for the vehicles registered in the state, will increase to about 12,700 miles per vehicle. Travel, therefore, in 1975 should be around 47 billion vehicle miles, as shown on the chart.

What Needs to Be Done

The Department, in 1959, for the purposes of this report, reviewed and brought up to date previous estimates of improvements required over the next several years. Adjustments were made for projects included in previous estimates but already accomplished or under way. For the most part, the estimates follow the "master plan" proposed by the Department in 1957. The Foundation has surveyed the proposals and has found the estimates adequate for a broad look at future requirements. Using them as a base, the following pages describe, in approximate terms, future requirements for modernizing, maintaining and operating the State Highway System.

Motor Vehicle Travel



12 Needs of the Interstate System

New Jersey's portion of the 41,000-mile National System of Interstate and Defense Highways is 368 miles. Of these miles, 54 are now part of the Turnpike. Thirty-nine additional miles already are in service as free roads on the State Highway System, but 30 of these miles need to be widened to meet Interstate standards. There are 275 miles remaining to be constructed on new location. The total cost of these improvements is estimated at \$1,165 million, of which the Federal government will pay 90 per cent.

As soon as non-toll Interstate mileage is opened to traffic, the Highway Department is responsible for its operation and maintenance the same as with other portions of the State Highway System. This accounts for a substantial portion of the increases in the estimated future maintenance costs as discussed in another section of this report.

When completed, there will be 139 miles of 4-lane freeways, 151 miles of 6-lane, 66 miles of 8-lane, and 12 miles of 10-lanes or more, together with the necessary separation structures and interchanges to achieve complete control of access.

It is estimated that, by 1975, this relatively small portion of the total road and street mile-

age in the state will carry 18 percent of all travel in the state. At that time, these freeways and the toll roads will be carrying nearly 30 percent of all travel. Time schedule for the completion of the Interstate routes is dependent upon Congressional appropriations. Present intentions indicate completion sometime beyond 1970.

Needs of Other State Highways

To provide a completely integrated network of trunk highways to handle the major traffic flows of the state will require the improvement of 2,392 miles of roadways in addition to the Interstate System and toll highways. Included are improvements to 606 miles not now a part

<i>Type of Work</i>	<i>Miles</i>	<i>Cost (Millions)</i>
Resurfacing	1,006	\$ 183
Minor Widening	301	77
Major Widening	444	308
Reconstruction (Existing location)	35	26
New Construction (New location)	606	991
Interchanges		14
Traffic Services, Drainage, etc.		38
TOTAL	2,392	\$1,637

New Jersey has made many unique contributions to the development of modern highways including the traffic rotary, the cloverleaf and fluorescent low-level bridge lighting. Such innovations are in this picture of the Trenton Freeway and the following four photographs.

of the operating State Highway System. Most added routes will be on new locations and complete control of access is anticipated. Expansion of existing routes to gain needed capacity will be accomplished through widening and dualization on existing locations with access controlled only to the extent consistent with conditions at the time of improvement. The preceding table shows the miles and costs of these improvements.

When Needs Accrue

These improvements will not be needed all at the same time. In fact, the estimates contemplate that the largest needs will be met in the period 6 to 15 years from now. The following table shows this distribution:

<i>Year Period</i>	<i>Amount (Millions)</i>
First 5 years	\$ 282
6 to 10 years	514
11 to 15 years	744
16 to 20 years	97
TOTAL	\$1,637

The gradual step-up in annual construction expenditures from \$56.4 million in the first five-

year period to \$148.8 million in the third period reflects consideration for past budget limitations and the practical difficulties of developing a financing plan to more than double present expenditures in a short period of time.

Should the state's finances permit, however, greatly accelerated construction programs would return worthwhile economic and safety benefits at a much earlier date.


Other Construction Costs

Annual construction costs shown in the accompanying chart contain, in addition to the amounts described above, presently unidentifiable construction which experience indicates will occur. Delay in meeting needs as they arise necessitates stop-gap work to hold roads in condition for travel. Stop-gap work can be held to a minimum by stepping up the rate of improvements. Such action would keep construction costs for this type of work at the approximate level of \$2.5 million throughout the years shown.

Additional costs will occur through unidentifiable replacements occasioned by floods, unexpected failures of pavements, and changes in traffic patterns. Over the 15 years shown in the chart, average amounts of \$3.2 million per year have been included to cover these costs.

Here is pictured the new Manahawkin Bay Bridge which has low-level lighting along the railing to minimize nighttime glare. This is the first of its kind.





In many locations in rolling mountainous terrain the Department has added a creeper lane alongside the original two-lane pavement. The added lane enables drivers to pass slower moving vehicles with ease and lessens chance-taking maneuvers. (Route 69 near Hampton).

Maintenance

Maintenance costs will increase as miles are added to the system, lanes are added to existing roads, grade separations and interchanges are built, wider rights of way are acquired, traffic increases in volume and weight, and as traffic services are stepped up to meet the greater demands for safety and convenience.

At present, the Department maintains some 5,000 lane-miles of pavements. Some 17.5 million square yards of shoulders must be maintained. Landscaped medians and intersections account for 3,900 acres requiring fine mowing and planting treatment. Care must be given 4,600 acres of roadside slope and ditch areas. In addition, the Department maintains 1,878 fixed bridges and maintains and operates 39 movable bridges.

Were the program to be completed as estimated, pavement areas would increase 64 percent, shoulder areas 35 percent, and landscaped medians and roadsides 72 percent. Bridges would increase by 32 percent. It is estimated that care of the additional facilities and increases in traffic would raise maintenance expenditures from the present \$14 million per year to \$27 million in about 20 years.

Administrative Costs

Experience of the Department in the range of expenditures anticipated by a stepped-up program indicates that future administrative costs will run about 2.5 percent of expenditures for construction and maintenance. These amounts have been included in annual costs.

Annual Program Amounts

The accompanying chart shows, historically, annual appropriations to the Department for State Highways. The 1959 amount shown is that budgeted for the fiscal year 1958-59. Superimposed on the amounts budgeted directly for State Highways are the costs of construction and rights of way for the two toll roads.

The amounts shown for the years 1960 onward are the annual distribution of the estimated program costs discussed earlier. Amounts of assumed Federal aid include the estimated cost of completing the Interstate System in New Jersey by 1975. Other Federal-aid appropriations are assumed to continue at current rates.

The chart serves to give a broad look at past appropriations and future requirements — the difference between the past and the future show

the approximate level to which state funds must be raised if New Jersey is to meet the traffic needs discussed. It can be seen from this chart that during the 1950's New Jersey engaged in large scale toll financing of highway construction to meet certain critical traffic demands. It also is apparent that expenditures at a similar level are required to meet present and future needs.

How rapidly headway will be made in meeting the needs is a matter to be decided by the legislature and the people of the state. It must be borne in mind, however, that delay in new construction will greatly increase the amounts required to hold inadequate facilities in service. Failure to provide adequate transportation facilities also will retard the normal economic development of the state. At the same time the public will be deprived of the added safety and freedom from congestion that the contemplated

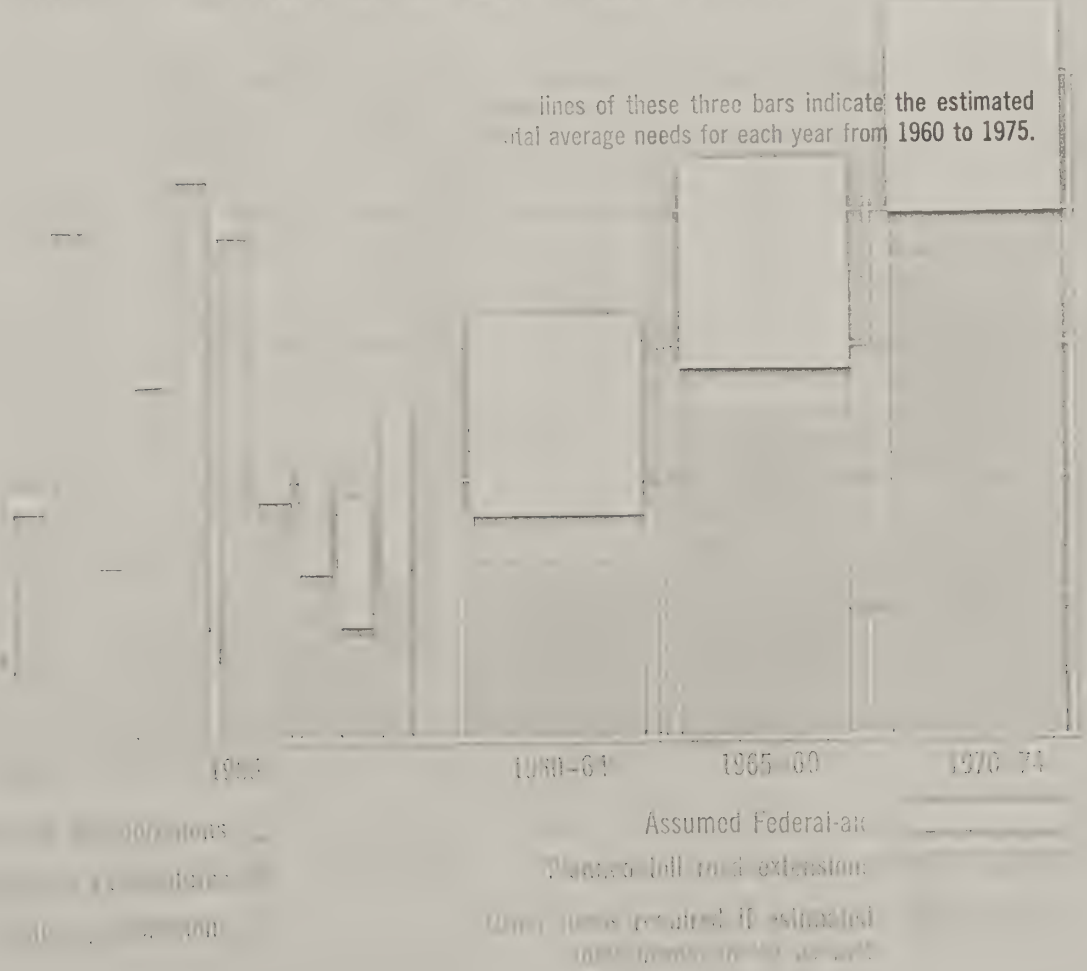
improvements would provide. Delays inevitably will add substantially to right of way costs.

Planning Ahead

The present year-to-year legislative appropriation of money to the Department greatly handicaps Department operations. Other states with specific revenues dedicated to highways are able to anticipate availability of funds sufficiently far in the future to establish logically planned construction programs. The complexity of highway location and design often requires three to five years to accomplish the various steps from preliminary engineering through design, right of way acquisition, inter-agency approvals, and construction.

To achieve utmost economy through contract construction requires smooth, well balanced scheduling of the work load. Scheduling contract lettings during periods of high construc-

State Highway and Toll Road Funds



An aerial photograph showing a highway interchange with 'jug handles'—curved ramps that eliminate the need for sharp turns within the main traffic lanes. The image is somewhat faded and grainy, typical of older documents.

Another innovation in New Jersey is construction of "jug handles" on existing heavily traveled highways. By eliminating turns within main traffic lanes, jug handles add greatly to safety and reduce delays. (U.S. 1 at Quaker Road.)

tion activities results in higher prices. The rush to get design work out in the early months of the fiscal years, to obligate the program within 12 months, does not permit the Department to do sound planning and scheduling of its work. Rights of way cannot be acquired on short notice. They must be obtained well in advance of construction. Many such difficulties would be avoided were the Department able to anticipate minimum construction budgets for at least five years ahead.

Were the Department provided with a revolving fund for right of way acquisition much delay could be avoided and substantial savings could be made, as experience in other states shows. Under the revolving fund method, right of way is acquired when need is evidenced; when funds for projects are established the revolving fund is then reimbursed.

Needed Capital Improvements

In addition to funds needed for road improvements and operations, the Department

faces need for more and better buildings and facilities.

The recommended reorganization described later in this report will require the establishment of district offices where highway activities can be centralized in one location in each of the suggested four districts of the state.

At the present time the field shacks in use by the maintenance forces scattered throughout the state do not add to the efficiency of operation or the dignity of New Jersey state government. With few exceptions they are made of salvaged lumber and materials; lack heat, water, light and sanitary facilities; and are eyesores in the neighborhoods where located. Lack of budget approvals and appropriations to gradually develop modern facilities leads to waste of labor and is costly in terms of inefficient maintenance operations.

System Designation

It was not the purpose of this study to examine each state highway route in detail and to analyze the character of the traffic being



To eliminate head-on collisions and sideswipes, the Department has constructed some 70 miles of center barriers on undivided, overburdened routes. Dramatic reductions in accidents and deaths have been registered where barriers have been installed.

served. However, Foundation engineers did examine the pattern and location of existing routes sufficiently to determine that the present State Highway System includes certain routes that are local in character and fails to include others which are of statewide importance. Part of New Jersey's problem stems from piecemeal legislative additions to the system. As a result of this practice there is a big difference between the "legislated" system and the "operating system."

Ambiguities in existing law make it practically impossible to determine the extent of the *legislated* system. Examination of the *operating* system shows isolated sections of State Highway connecting with county roads at either end and other sections connecting with state highways only at one end. These facts point up the need for a thorough review of highway classification and system designation.

The master plan developed by the State Highway Department proposes the addition of 606 miles of freeways not now included in the State Highway System. In a state with New Jersey's concentration of population and vehicles, de-

velopment of an integrated system of freeways could well be the principal objective of the state. Under such a plan the responsibilities for operation and maintenance of connecting feeder and service roads could be returned to local jurisdictions.

It is recommended that the Department continue studies of highway classification, gathering necessary data for logical division of highway responsibilities between the state and the various local jurisdictions. Facts developed by the Department through such a study would materially assist the legislature in the development of an integrated highway transportation plan.

* * *

Increased expenditures are not the only requirement for meeting the imminent problems of the future. A program of the magnitude contemplated will require increases in personnel and utmost efficiency in operation and the maximum utilization of the Department's forces. Activities under way and to be undertaken by the state are discussed in the next section.

Organization and personnel

Since establishment of the State Highway Department 43 years ago, administering the State Highway System has become more and more complex. And the end is not in sight.

The fact that the Highway Department has functioned as well as it has is more of a tribute to the competence of the men in the organization, and the close working relationships they have developed over the years, than to the soundness of the basic management structure.

New Jersey now is entering a period when highway management is becoming more complex and more costly, and when many of the senior employees responsible for past successes are soon to retire from the Department. Efficient highway transportation is so essential that the state no longer can afford to rely on a structure which depends so strongly on informal

A highway facility is the end product of a vast amount of preparatory work as well as construction. To successfully carry on the complex work, management must have clear-cut responsibilities, and personnel must be efficiently organized.



relationships between individual employees for its functioning. A major reorganization of the Department is needed.

The Foundation recommends, and the Department now has under study, a reorganization plan which would centralize policy determination in the Trenton headquarters and assign operating responsibilities to district engineers in designated areas of the state. The recommended line-and-staff plan differs substantially from the one now employed.

At present the eight divisions of the Department have a high degree of autonomy, both in internal organization and in operations. Five divisions involved in engineering report through the State Highway Engineer; the other three report directly to the Commissioner. Under the divisions are 17 bureaus and more than 50

branches, sections, and field offices.

19

The divisions have differences in field organizations and differences exist between the bureaus of a single division. Boundaries of the various field organizations have little in common and for some bureaus are indefinite.

As the Department has grown it has become increasingly difficult for division and bureau chiefs to find time to make necessary decisions promptly and follow through within their individual lines-of-command and, at the same time, properly coordinate and cooperate with others.

Reorganization Plan

In accord with the Foundation's findings, the Commissioner of Highways has recently initiated action pointing to reorganization of the

Good maintenance means keeping facilities as nearly as possible in original condition. To do that requires an efficient maintenance organization and an adequate budget—within the next two decades, maintenance costs probably will nearly double.



Department. A task force from his staff has been designated to determine how the line-and-staff organization can be accomplished progressively. Civil Service Commission officials have indicated willingness to cooperate in solving personnel problems involved in the reorganization.

This form of organization would achieve —

- Better coordination of the activities of the various divisions and bureaus of the Department
- Better distribution of the work load between those who decide policies, procedures and schedules and those who carry them out
- Better field operations as a result of more immediate field observation and control
- Closer liaison within units of the Department and with local governments, legislators and the public.

The goal toward which the task force is working is that of establishing a direct flow of authority and responsibility from the chief administrator on down. At each administrative level the degree of authority is more limited in scope than that of the level above it. This is the form of organization which, with appropriate modifications, is used by most state highway departments, by large businesses and by military establishments.

Among the duties facing the task force are: logical grouping of similar work functions, establishment of geographical operating districts for field activities with responsibility for all work functions for each area assigned to a district engineer, and determination of work load. Following that will be selection of personnel based on qualifications and experience.

Personnel

Several important administrative and legislative steps are necessary to implement the Department's reorganization plan.

The present employee classification structure is cumbersome and handicaps the Department in its work and in staffing.

Among the Department's 2,200 salaried employees there are more than 250 different civil service titles. About 100 of these apply to 100 different single positions of specialized character. Most states have only a fraction of that many titles. In New Jersey classification titles

are spread among all divisions and apply mostly in higher pay ranges. Single position classifications for the most part are what normally would be considered organizational or operating titles and not true classification titles.

The civil service policy of filling vacancies through promotional examinations leads to the practice of keeping the scope of such examinations narrow and confined to employees in single divisions and bureaus, and to the practice of creating single position titles for upward salary adjustments for individual employees.

Under the single position practice, the Department is handicapped by not being able always to shift men where they could be of most value, and the individual loses the opportunity for training and experience in related fields. Morale is adversely affected by the limitation of advancement opportunities.

Engineer Classification

The inadequacy of the present classification plan is reflected in the imbalance in pay ranges. The 460-odd engineer title positions fall in 16 pay ranges. Of these more than 400, about 85 percent, fall in the three lowest pay ranges for the engineering positions, the so-called assistant, senior, and principal engineer classifications, each having a number of parenthetical titles. The lowest pay range, the assistant engineer class, includes about 190 positions, more than 40 percent of the total; probably many of those are not filled by engineers in the professional sense.

An over-lapping classification plan is needed: one for professional engineers and one for technicians and sub-professionals. Under such a plan sub-professionals would be permitted to progress in responsibility and salary to the point where professional competence is required. Duties and responsibilities above that point would require candidates to be either engineering graduates or registered as professional engineers.

The Civil Service Commission has indicated its willingness to accomplish the reclassification of employees in line with the above suggestion.

Paralleling administrative action is the need for changes in civil service law which would give the Department needed flexibility in utilizing personnel and in strengthening the Department structure. A recommended law change is discussed in the legislative section on page 27.



This tar-papered shack, built of salvaged materials, typifies housing for the Department's maintenance forces. Generally, field maintenance headquarters lack water, light, heat and sanitary facilities. At this location there is room only for one truck at a time. Salt for winter operations is stored in the open.

To improve the service and safety of older facilities New Jersey has done many things, as pictured earlier. Here on U.S. 1 a wide, firm shoulder is being constructed.



Law and highway development

Highway law and highway development are inseparable. The law is the instrument which established the New Jersey State Highway Department, prescribes responsibilities, and vests it with the necessary authority to perform the public service intended.

Highway management is a complex and technical operation which directly affects the economic and social well being of all citizens. The basic economy of the state is guided or controlled to a very large degree by the expenditures of public funds required for highway transportation service.

Administration of state highways entails many activities: designation of the system, planning, programming, acquisition of rights of way and rights of access, contract letting, construction, maintenance, operations, relationships with other government agencies and many others.

Since those functions must be conducted within the framework of law, management cannot be expected to perform adequately and effi-

Well-traveled now, usefulness of the Trenton Freeway will increase greatly as Interstate routes are completed. The Freeway is a key part of the Interstate System which will serve much of New Jersey's high traffic volume demands.



ciently unless the best legal tools are provided.

In general terms, highway law should not be so restrictive as to deny flexibility of action, particularly on matters of engineering character, or so broad as to constitute an unlawful delegation of authority. The scope of authority granted should permit application of modern management and engineering policies and practices. All law should be so drafted and organized as to be clear and definite in assignment of responsibility. Particular attention should be given to defining some of the more technical words and phrases so that they may be uniformly construed.

Highway law consists of two elements, the legal mandate, and the legal action. The means of expressing the legislative mandate is through the printed statutes. Because of human limitations, ambiguities and misinterpretations of the written law often occur.

Legislatures cannot foresee all detailed problems arising when laws are passed, although

they may know the objectives and purposes of the legislation. Because of differences of opinion or interpretation that may arise, the courts and attorney generals are frequently called on to give opinions as to legislative intent. These opinions are only temporary and may be reversed. Several states have adopted a separate statement of legislative intent as means of making sure that the legislature itself and the courts and highway administrator are in agreement.

With these general criteria in mind, a review and evaluation were made of New Jersey highway law. To a large extent comparisons were based on the experiences and information developed through the highway law research project now in progress under the auspices of the Highway Research Board of the National Research Council in cooperation with the U. S. Bureau of Public Roads and the several state highway departments.

Conclusions reached were arrived at after consultation with legal counsel and other offi-



cials of the Department. Recommendations follow for substantive revisions of the law to carry out the objectives of this report which broadly summarizes suggestions for law improvement.

State-aid Law

Well managed state-aid highway programs throughout the country have the principal objective of controlling the development of local roads and streets to insure orderly advancement of a state's highway transportation system.

Present state-aid laws in New Jersey are the product of numerous sessions of the legislature. In 1891 the original law was enacted. Since then many sections have been amended and others added. State-aid law now contains some 83 separate sections, many of which are no longer in operation. Some sections conflict with others and there are numerous duplications, overlappings and ambiguities. Other sections

have been repealed only by implication. Because of these discrepancies, arbitrary decisions are often required in administering state-aid funds.

Distribution of state aid among the counties and municipalities does not consider relative need or the state's responsibilities as an equalizing agent. Allocations are not made with apparent objectives or plans in mind.

It is recommended that the legislature review existing state-aid statutes and re-draft the laws so that the policies and desires of the state are clearly spelled out. The laws should be designed not only to extend financial aid but to assure orderly development of an integrated local highway system. This would require:

- Selecting a system of roads and streets eligible for state aid
- Determining the extent of state interest and responsibility
- Establishing equitable allocation formulas.

Interstate System highways are designed for non-stop travel, free of intersection interferences. By reason of prior planning, this section of Interstate 78 near Still Valley is being converted into a freeway by addition of two more traffic lanes, with a wide median between the new pavement and that built earlier.



At present the New Jersey Highway Department does not have full legal authority to control traffic on State Highways; responsibilities are now shared with the Division of Motor Vehicles of the Department of Public Laws and Safety.

Legal authority is vested largely in the Division of Motor Vehicles, although the law does give the Highway Department some authority. That the law is unsatisfactory is evidenced by an Executive Order in 1955 which makes the Highway Department primarily responsible for traffic operations—but actions still are subject to approval by the Motor Vehicle Division.

The inconsistencies involved and the improper placement of legal authority has produced an understandable reluctance to develop a single strong operating unit within the Highway Department.

Consequently, traffic operations on State Highways fall short of needs. The function now is handled in varying degrees by five bureaus in three divisions of the Highway Department, and by the review and approval unit of the Motor Vehicle Division.

Under the present arrangement, the Division of Motor Vehicles is in a position of passing judgment on matters that should be the prerogative of the Highway Department. Decision to use certain traffic measures or control devices often are an alternative to construction or reconstruction. Designs for new construction involve features which require detailed traffic engineering knowledge. Such matters cannot be properly commented upon, approved or disapproved by another division not part and parcel of the original planning and designing of projects.

Although the pavement is sound, and heavy traffic is carried, this is an obsolete highway, as may be seen by comparison with the photograph on the opposite page. The New Jersey State Highway Department, through lighting, lane marking and center dividers, has been trying to force out-moded highways to "make-do" at least cost.





Painstakingly prepared models of proposed major highway facilities are used to determine the best locations with regard to cost, existing land usage and terrain. The models are used also to acquaint local public officials with the complex problems involved and to show how the facilities will serve the communities.

Other serious problems involve uniformity of traffic control devices. Title 39 of the Revised Statutes contains detailed descriptions and illustrations of traffic control devices which restrict progressive modernization of traffic control systems.

This same title instructed the Division of Motor Vehicles to publish and keep current a manual containing the specifications for signs, signals and markings to be used throughout New Jersey. Such a manual has not been published.

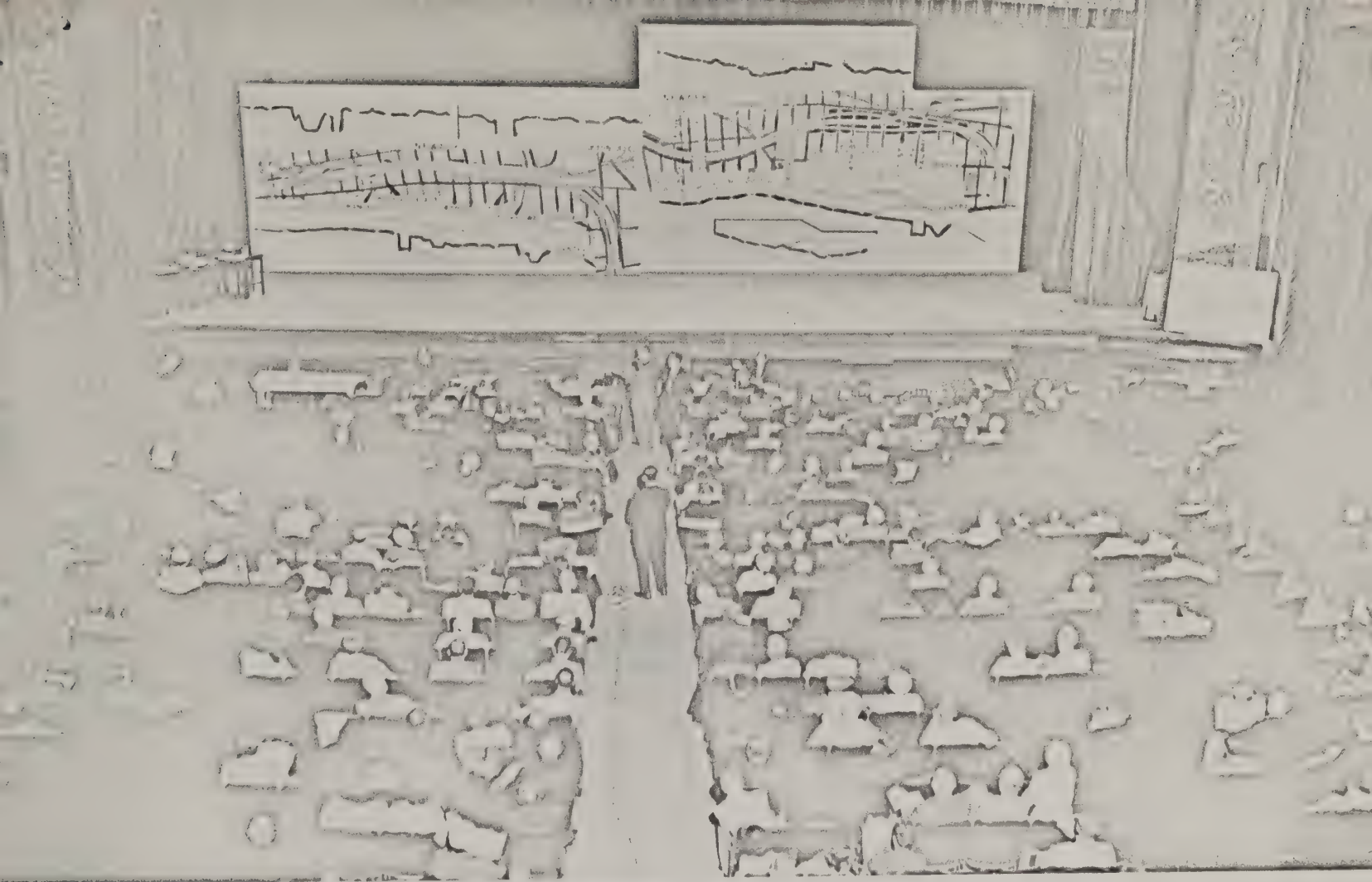
At present the National Manual of Uniform Traffic Control Devices is in the process of revision to better serve present day needs. Traffic control devices conforming to the standards to be contained in the new manual will be mandatory on all Federal-aid highways in accordance with Section 109(d), Chapter 1 of the 1958 Federal Highway Act. New Jersey would be well advised to apply these standards generally

to avoid confusion in signing as between Federal-aid and non-Federal-aid highways.

Recommendations:

1. Laws should be amended to give the Commissioner of Highways authority to establish traffic regulations on the State Highway System without approval of any other state official.
2. Laws should be amended to require the Commissioner of Highways to prepare, publish, and keep current, a manual which specifies standards and uniform practices for traffic control and regulations. All traffic and highway authorities should be required to conform to it. Specific design of traffic control devices in Title 39 should be eliminated.

The Division of Motor Vehicles would approve or disapprove regulations proposed by local officials to assure manual conformance.



Outstanding leadership in governmental relationships has been given by the Department in coordinating plans for major highways to obtain the utmost usefulness and satisfaction for the communities served. Proposals in the "master plan" have been reviewed with local officials and public hearings held on Interstate Highway System locations, such as pictured here. The Department is engaged now in a joint project with governing bodies in the Camden-Philadelphia area to establish over-all highway plans.

Personnel

Competent engineer and technician personnel are in short supply, both within and outside the Department. For most effective and efficient administration of the Department's many activities, there is need for greater flexibility in civil service promotions.

Section 11:10-6 of the Civil Service Act requires promotional appointments to be made from among the top three eligibles of an employment list. For many professional and technical positions some requirements cannot be effectively measured by the examining programs of the Civil Service Commission. Thus, career employees who, frequently from an administrative standpoint, are best qualified to fill vacant positions are not within the top three eligibles of the employment lists established as a result of competitive examinations.

The type of classification plan described on page 20 contemplates that after an employee

qualifies for entrance into Civil Service, subsequent qualification for promotion is based on satisfactory experience. As employees advance in experience often administrative ability is as important as technical ability.

To meet this problem, it is recommended that Section 11:10-6 be broadened to permit filling of vacancies by appointing any qualified career employee whose name appears on the employment list, regardless of rank. This would provide assurance of the technical qualification, and at the same time, permit appointment of the individual considered best qualified from an administrative standpoint.

Public Utilities

The present Freeway and Parkway Act grants the State Highway Commissioner power to order public utilities to relocate or remove their facilities to accommodate the construction of a freeway or parkway. The question of a state

paying for such relocation or removal is highly controversial. However, New Jersey law requires the State Highway Department to pay all costs, including the cost of installing such facilities in a new location and the cost of land or any rights or interest in the land and any other right acquired to accomplish such removal or relocation.

But the New Jersey law is not clear as to the Department's authority to condemn such needed land. Lack of the power of condemnation often impedes construction of the needed facilities in that present utilities cannot be disrupted until they have been replaced. Lengthy litigation which often results in the negotiation for such parcels of land prevents the Department from proper scheduling of freeway projects.

If this practice of state relocation of utilities is to be continued, the law should be amended to clarify this technicality and permit the state to acquire by condemnation or otherwise the necessary lands to relocate public utilities.

Conclusion

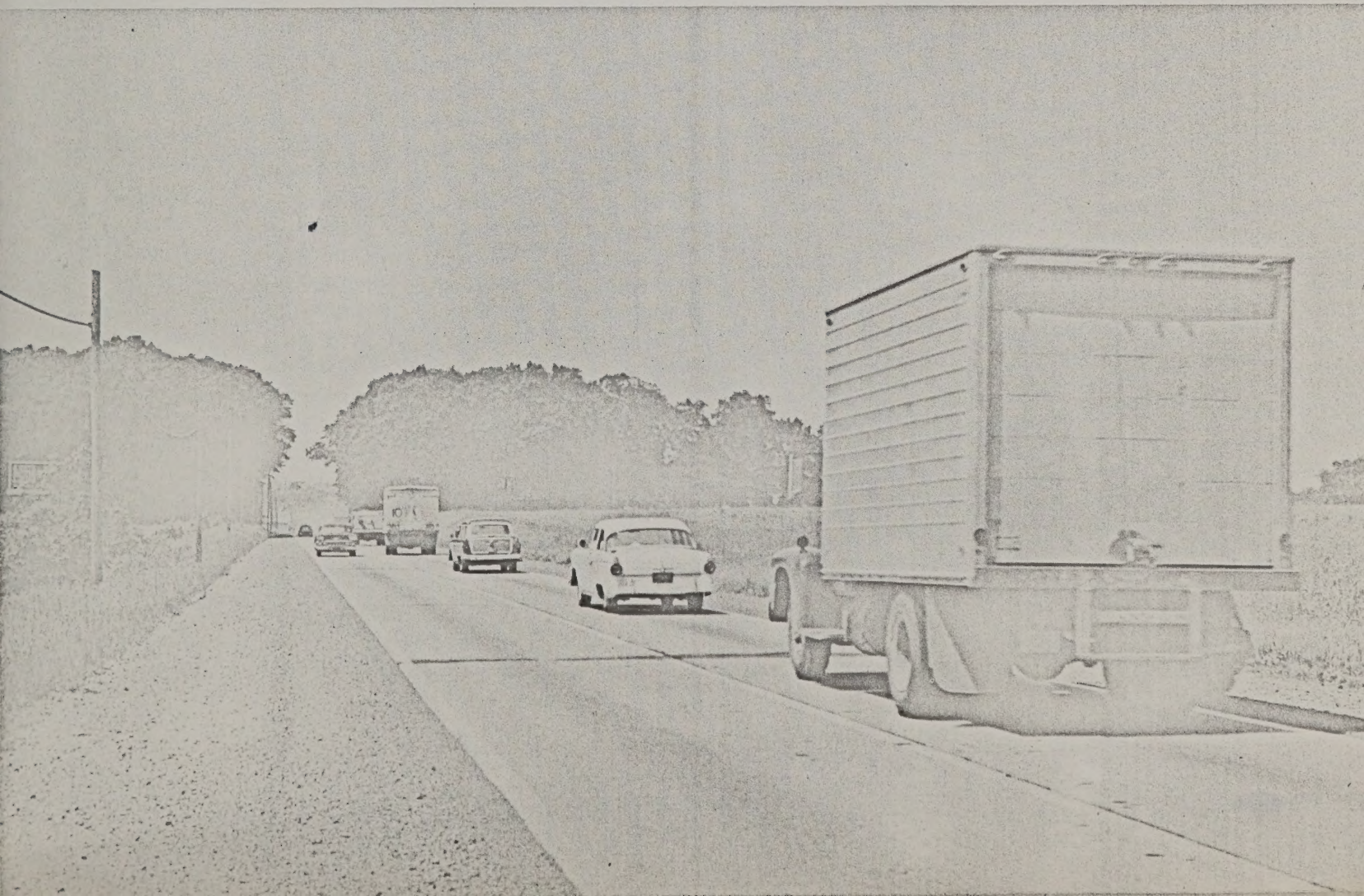
It is apparent from consideration of the foregoing findings that administrative action alone can solve only a minor portion of New Jersey's highway problem.

The basic issues now confronting the state—in the fields of finance, modernization of laws, and departmental reorganization—require action by the legislature.

In a field as dynamic and ever-changing as highway transportation, it is inevitable that problems which cannot be envisioned today will crop up in the future. The sooner that these problems are detected and appropriate remedial action taken, the easier they will be solved.

The growing importance of highway transportation to the well-being of the people of New Jersey suggests the wisdom of action by the legislature to establish a continuing Legislative Study Committee which would concern itself with all phases of the state's land transportation problems.

Once upon a time a highway such as this was indeed a modern road. While this section of U.S. 202 near Flemington is adequate for today's traffic, shortly it and many other two-lane highways must give way to multi-lane arteries.





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